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**EUROPEAN PATENT APPLICATION**

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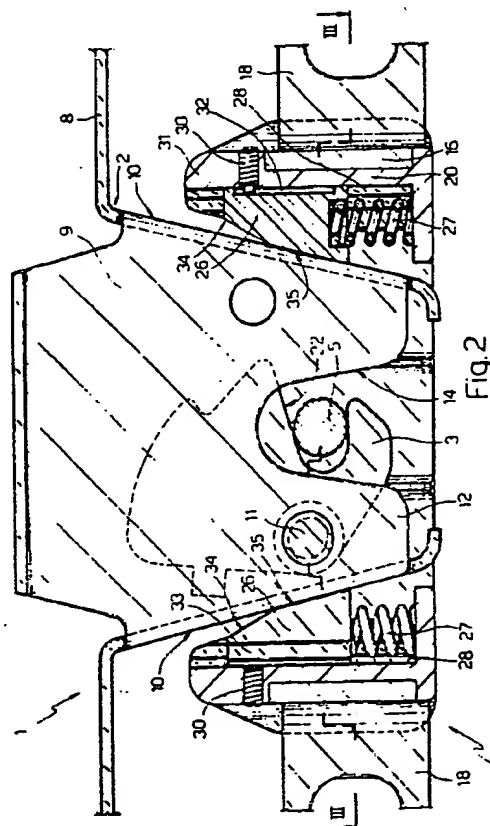
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Lock, in particular for a vehicle tail hatch, with transverse immobilisation and automatic take-up of slack.

A lock for a vehicle tail hatch is described, composed of a lock plate mountable rigid with the hatch and defined by a bracket provided with a projecting trapezoidal element, and a striker unit mountable rigid with the vehicle body in the luggage compartment and comprising a further bracket and a striker pin (5) which is engaged by a rotatable fork (22) carried by the lock plate with the trapezoidal element which is inserted into the striker unit bracket; this latter bracket laterally carries a pair of wedge-shaped blocks (26) slidable against the action of springs in the direction in which the trapezoidal element is inserted into the striker unit bracket, said blocks cooperating with respective oblique edges of the trapezoidal element such that these latter cause them to retract by different amounts if the positions of the lock plate and striker unit differ transversely, so as to enable the trapezoidal element to be inserted into the striker unit bracket with consequent lateral immobilisation of the lock plate under all conditions.



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hatch or lid the lock plate 2 undergoes translational movement to approach the striker unit 4 by following a trajectory substantially parallel to the slot 14, to produce progressive insertion of the element 9 into the sleeve 20. If the lock plate 2 and striker unit 4 are correctly positioned, the edges 10 make simultaneous contact with the blocks 26 to cause these to both retract by the same distance until the edge 22 makes contact with the pin 5 to rotate the fork 3 and cause it to hook over the pin 5. In this manner the lock plate 2 is rigidly locked to the striker unit 4 both axially in the direction in which the element 9 is inserted into the bracket 16, i.e. parallel to the direction of closure of said hatch or lid, and laterally in that by virtue of the elastic reaction of the springs 27 the blocks 26 prevent lateral movement of the element 9 even if this is only loosely engaged with the pin 5, the fork 3 being disposed in such a manner as to allow relative lateral movement of the pin 5. If however there is a transverse difference in the positions of the lock plate 2 and striker unit 4, as they approach each other only one of the blocks 26 makes contact with the element 9 and is consequently retracted to compress the relative spring 27 and compensate this transverse difference, until the other block 26 also comes into contact with the element 9. From this point onwards, the blocks 26 are retracted simultaneously until the fork 3 engages with the pin 5, this engagement not being hindered by this transverse position difference because of the rather large lateral clearance between the pin 5, the fork 3 and the relative slot 14. Thus axial immobilisation of the lock plate 2 is again obtained by virtue of the fork 3, and lateral immobilisation is also obtained by virtue of the thrust which the blocks 26 exert against the element 9.

The advantages of the present invention are apparent from the foregoing description. In this respect, a very simple and low-cost lock is obtained which has the same structure as currently used known locks, but which in contrast to these latter ensures lateral immobilisation of the lock plate and consequently of the hatch or lid rigid with it, independently of any lateral misalignment between the lock plate and striker unit. This results both in reduction of the lock wear and elimination of vibration or noise during vehicle running.

#### Claims

1. A vehicle lock, particularly to a tail hatch thereof, of the type comprising a striker unit comprising a first bracket and a striker pin carried rigidly by said bracket, and a lock plate rigidly lockable to said striker unit and comprising a second bracket and a transverse element of substan-

5 tially isosceles trapezium plan shape rigid with the central part of said second bracket and projecting therefrom, said trapezoidal element carrying a rotatable fork arranged to engage said pin and supporting a locking mechanism for locking said fork in a position of engagement with said pin when said lock plate cooperates with said striker unit, said trapezoidal element being arranged to be inserted into said first bracket so that a longitudinal slot provided in it in the direction of its insertion into said first bracket engages said pin with lateral clearance, characterised in that said striker unit is provided laterally with a pair of opposing wedge shaped blocks carried longitudinally slidable in the direction of insertion of the trapezoidal element into said first bracket and perpendicular to said striker pin against the action of elastic means, said trapezoidal projecting element of the lock plate being provided with respective oblique longitudinal side edges which converge in the direction of insertion of said trapezoidal element into said first bracket and are arranged to cooperate with said wedge-shaped blocks to laterally immobilise said lock plate relative to said striker unit.

25 2. A lock as claimed in claim 1, characterised in that said rotatable fork is arranged to engage said striker pin so as to immobilise the lock plate against the striker unit only in the longitudinal direction, i.e. the direction in which said trapezoidal element is inserted into said first bracket, lateral immobilisation of said lock plate against the striker unit being provided by said wedge-shaped blocks which are arranged to compensate any lateral misalignment between the lock plate and striker unit by retracting to a different extent against said elastic means by the effect of their cooperation with said oblique edges of the trapezoidal element on inserting this latter into said first bracket.

40 3. A lock as claimed in claim 1 or 2, characterised in that said wedge-shaped blocks are slidably inserted into respective opposing guides carried rigidly by said first bracket on opposite sides of said striker pin and positioned perpendicular thereto, travel limiting means being provided rigid with said first bracket to prevent expulsion of said wedge-shaped blocks from said guides under the thrust of said elastic means.

45 4. A lock as claimed in claim 3, characterised in that said wedge-shaped blocks are of synthetic plastics construction and are slidably carried by a synthetic plastics sleeve inserted rigidly into said first bracket, said guides for the blocks being formed longitudinally within said sleeve and being substantially of T-shaped cross-section, a preloaded helical spring being housed, interposed between each said slidable wedge-shaped block and a base wall provided on said sleeve perpendicular to said guides at the end distant from that through which

said trapezoidal element is inserted into said first bracket, in the corresponding said guide so as to cooperate with the respective block in order to urge it to project partly beyond said first bracket to assume an end-of-travel position defined by respective transverse screws carried by said sleeve and cooperating with respective grooves in said blocks.

5. A lock as claimed in any one of the preceding claims, characterised in that said first bracket is substantially of U shape and terminates with respective laterally projecting connection lugs.

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# **LOCK, IN PARTICULAR FOR A VEHICLE TAIL HATCH, WITH TRANSVERSE IMMOBILISATION AND AUTOMATIC TAKE-UP OF SLACK**

This invention relates to a lock of the type comprising a rotating fork and a locking mechanism therefore which are carried by a support element known as the lock plate, and a pin onto which the fork hooks and which is rigid with a second support element known as the striker unit, into which the lock plate is inserted with translational motion so as to cause the pin to be engaged by the fork.

Locks of the aforesaid type are mostly used on vehicles, and in particular for fastening the vehicle tail hatch or boot lid to the body when in the closed position. In known locks of the aforesaid type the tail hatch cannot be correctly immobilised in the transverse direction because the mounting tolerances can produce a transverse difference between the position of the lock plate and the position of the striker unit which can be as much as a several millimetres, either because of incorrect centering of the hatch within the opening which houses it on the vehicle body, or because of errors in assembling the lock plate or striker unit. In order to compensate these transverse differences, the engagement between the fork and striker pin has to be made with rather large lateral clearances. This lack of transverse immobilisation of the hatch results in annoying vibration during running, and overloading of the lock structure, which can cause jamming, malfunction and rapid wear.

The object of the invention is to provide a lock of the said type which has a structure such as to prohibit any transverse movement of the lock plate relative to the striker unit, even if the transverse difference in their positions is relatively large. Said object is attained according to the invention by a vehicle lock, particularly for a tail hatch thereof, of the type comprising a striker unit comprising a first bracket and a striker pin carried rigidly by said bracket, and a lock plate rigidly lockable to said striker unit and comprising a second bracket and a transverse element of substantially isosceles trapezium plan shape rigid with the central part of said second bracket and projecting therefrom, said trapezoidal element carrying a rotatable fork arranged to engage said pin and supporting a locking mechanism for locking said fork in a position of engagement with said pin when said lock plate cooperates with said striker unit, said trapezoidal element being arranged to be inserted into said first bracket so that a longitudinal slot provided in it in the direction of its insertion into said first bracket engages said pin with lateral clearance, characterised in that said striker unit is provided laterally

with a pair of opposing wedge-shaped blocks carried longitudinally slidable in the direction of insertion of the trapezoidal element into said first bracket and perpendicular to said striker pin against the action of elastic means, said trapezoidal projecting element of the lock plate being provided with respective oblique longitudinal side edges which converge in the direction of insertion of said trapezoidal element into said first bracket and are arranged to cooperate with said wedge-shaped blocks to laterally immobilise said lock plate relative to said striker unit.

The invention will be more apparent from the non-limiting description of one embodiment thereof given hereinafter with reference to the accompanying drawings in which:

Figure 1 is an elevational view of a lock constructed in accordance with the invention with its two main components disengaged but disposed in their operating position;

Figure 2 is a sectional elevational view of the lock of Figure 1 to an enlarged scale with its component elements engaged; and

Figure 3 is a sectional on the line III-III of the lock of Figure 2.

In Figure 1 the reference numeral 1 indicates overall a lock for a known vehicle of any type and therefore not shown for simplicity, and in particular for a tail hatch or lid closing a motor vehicle luggage compartment, of the type comprising a first support element or lock plate 2 carrying a rotatable fork 3 and arranged to carry a locking mechanism for the fork 3 which is of known type and therefore not shown for simplicity, and a second support or striker unit 4 rigidly carrying a striker pin 5, which the fork 3 is arranged to engage in order to close the lock 1 when the lock plate 2 is made to approach the striker unit 4 with translational motion until the two elements are brought into cooperation by insertion one into the other. The lock plate is normally mounted rigid with said hatch or lid of said vehicle, not shown, whereas the striker unit 4 is mounted rigid with the body of said vehicle, not shown, in correspondence with the rim of the luggage compartment on which said hatch or lid abuts when in the closed position. In all cases the lock plate 2 and striker unit 4 are mounted for use exactly in the position illustrated in Figure 1, so that they are brought into contact by the vertical closure movement of the hatch or lid in order to be rigidly fastened together by the engagement of the fork 3 on the pin 5, as illustrated in Figure 2, which shows the lock 1 in its closed

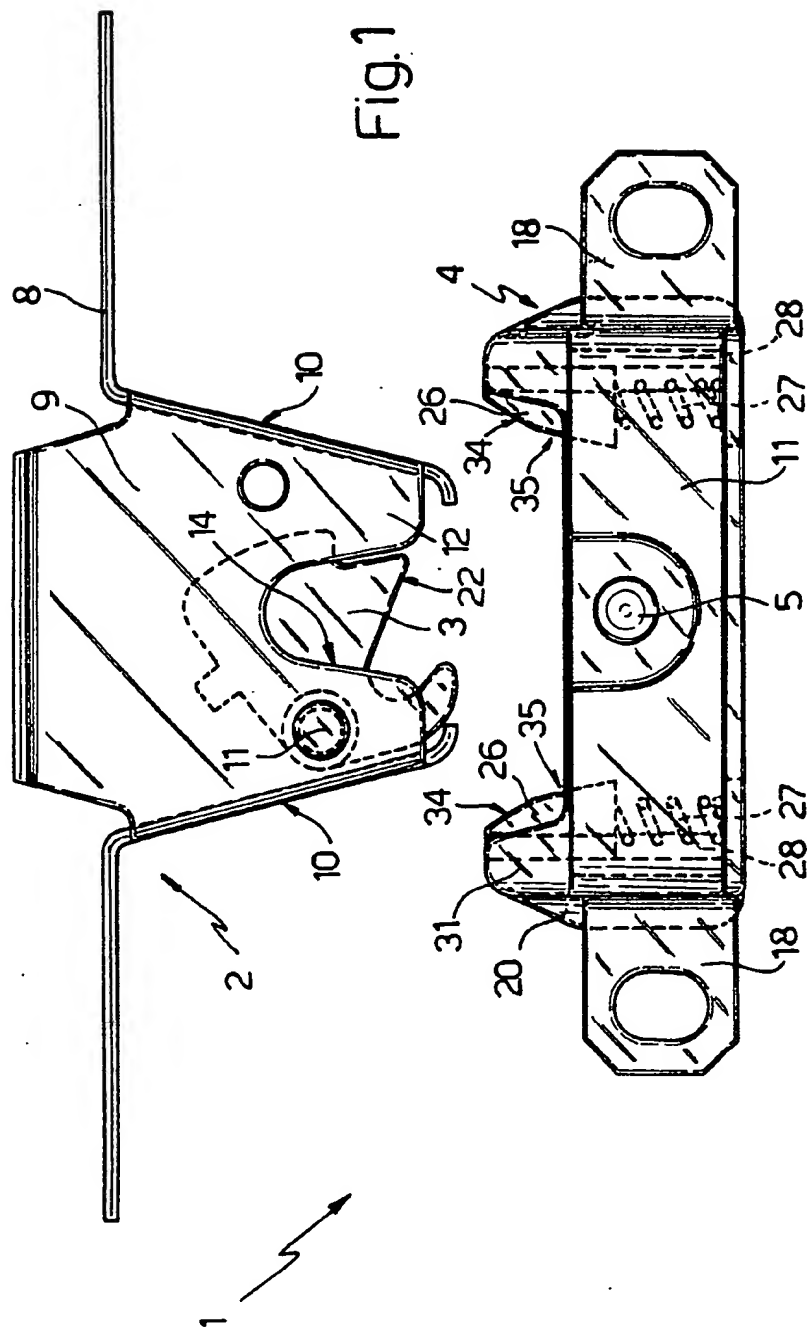
position.

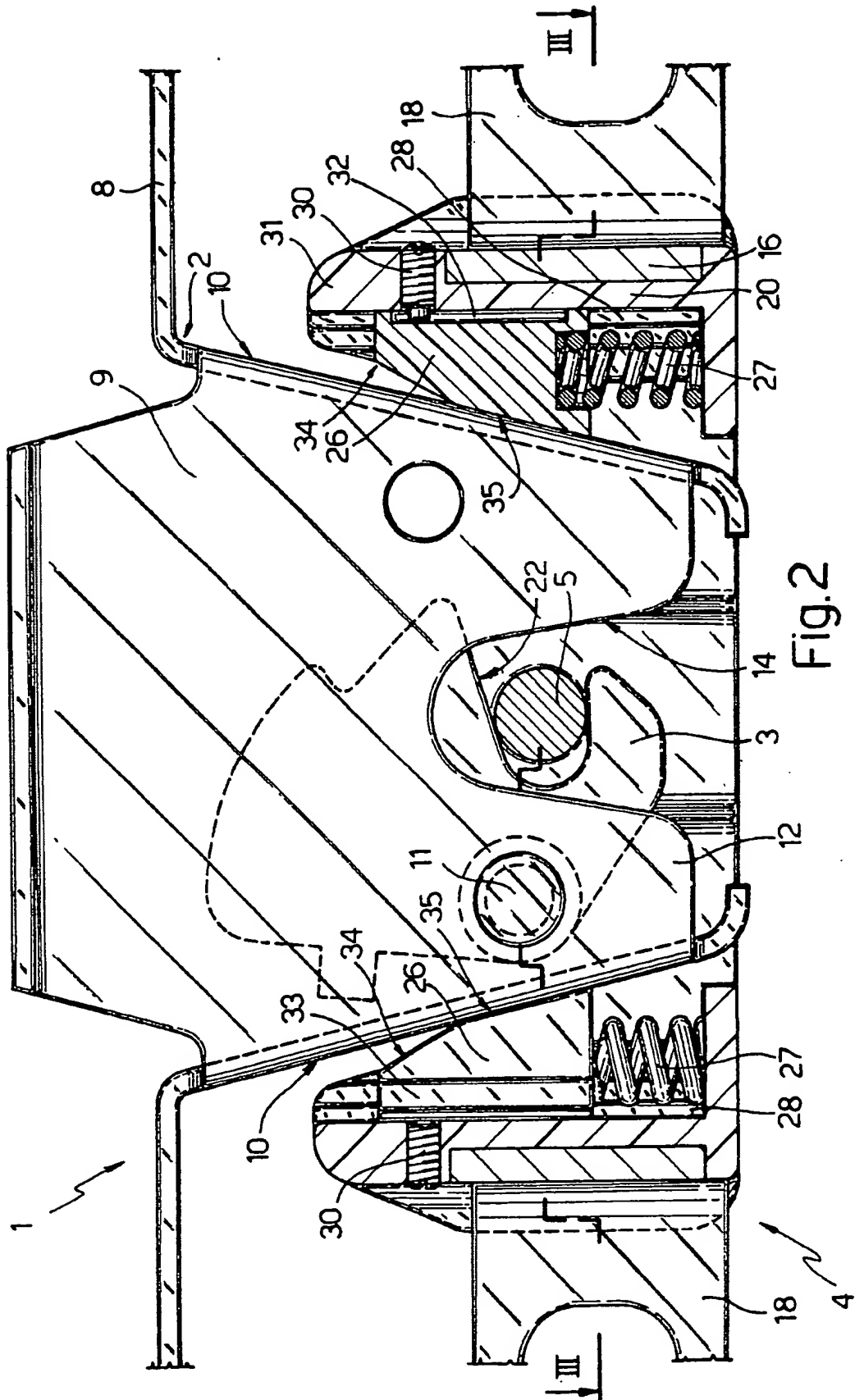
With reference also to Figures 2 and 3 the lock plate 2 comprises a substantially flat bracket 8 for fixing to said hatch or lid of the known vehicle, not shown, and a central transverse element 9 projecting laterally from the central part of the bracket 8 and having the shape substantially of an isosceles trapezium in plan, in a plane perpendicular to the axis of the pin 5. The element 9 carries the fork 3 rotatable about a pin 9 and is arranged to carry said known fork locking mechanism; not shown for simplicity, said mechanism, of which the lock control known of known type, not shown for simplicity, also forms part, being arranged to cooperate with the fork 3 in order to lock it, when the lock plate 2 cooperates with the striker unit 4, in the position shown in Figure 2 in which it is engaged with the pin 5. Preferably, the projecting element 9 and the bracket 8 are formed integrally in one piece by bending and semi-blanking a metal plate, for example of steel. The trapezoidal element 9 is longitudinally delimited by respective oblique bent lateral edges 10 which converge towards that end 12 of the element 9 facing the striker unit 4, and is provided along its longitudinal axis with a slot 14 open towards the end 12 and shaped so as to engage the pin 5 with considerable axial clearance in correspondence with the fork 3, which projects across it, on engagement between the lock plate 2 and striker unit 4. This latter comprises a substantially U-shaped metal bracket 16 terminating with respective connection lugs 18 which project laterally, the pin 5, which is rigidly fixed to the centre line of the bracket 16 for example by clinching in a hole 19 passing through it (Figure 3), and a sleeve 20 of substantially rectangular cross-section which is constructed of a synthetic plastics material and is inserted rigidly into the bracket 16, in which it is retained so that part of it projects axially towards the lock plate in a manner perpendicular to the lugs 18 by the pin 5, for example by again clinching this latter in a hole 21 passing through a side wall of the sleeve 20. The trapezoidal element 9 is arranged to be inserted in the direction of its longitudinal axis starting from its end 12 into the bracket 16, and specifically into the sleeve 20, during the movement of the lock plate 2 towards the striker unit 4, so that its slot 14 engages the pin 5 with transverse clearance such that this latter rests against the front edge 22 of the fork 3 to consequently rotate this latter from its disengaged position of Figure 1 into its engaged position of Figure 2. According to the invention the rotatable fork 3 is arranged to engage the striker pin 5 so as to immobilise the lock plate 2 against the striker unit 4 only in the longitudinal direction in which the trapezoidal element 9 is inserted into the bracket 16, the lateral immobilisation of the lock plate 2

against the striker unit 4 being effected by respective wedge-shaped blocks 26 provided laterally on the striker unit 4 and carried by the bracket 16 in a manner longitudinally slidable perpendicular to the striker pin 5 in the direction of insertion of the trapezoidal element 9 into the bracket 16 against the action of elastic means 27, and are arranged to cooperate by means of their oblique edges 10 to laterally immobilise the lock plate 2 relative to the striker unit 4 and simultaneously to compensate any lateral misalignment of the lock plate 2 with respect to the striker unit 4 by retracting to a different extent against the action of the elastic means 27 by the effect of their cooperation with the oblique edges 10 of the trapezoidal element 9, on insertion of this latter into the bracket 16.

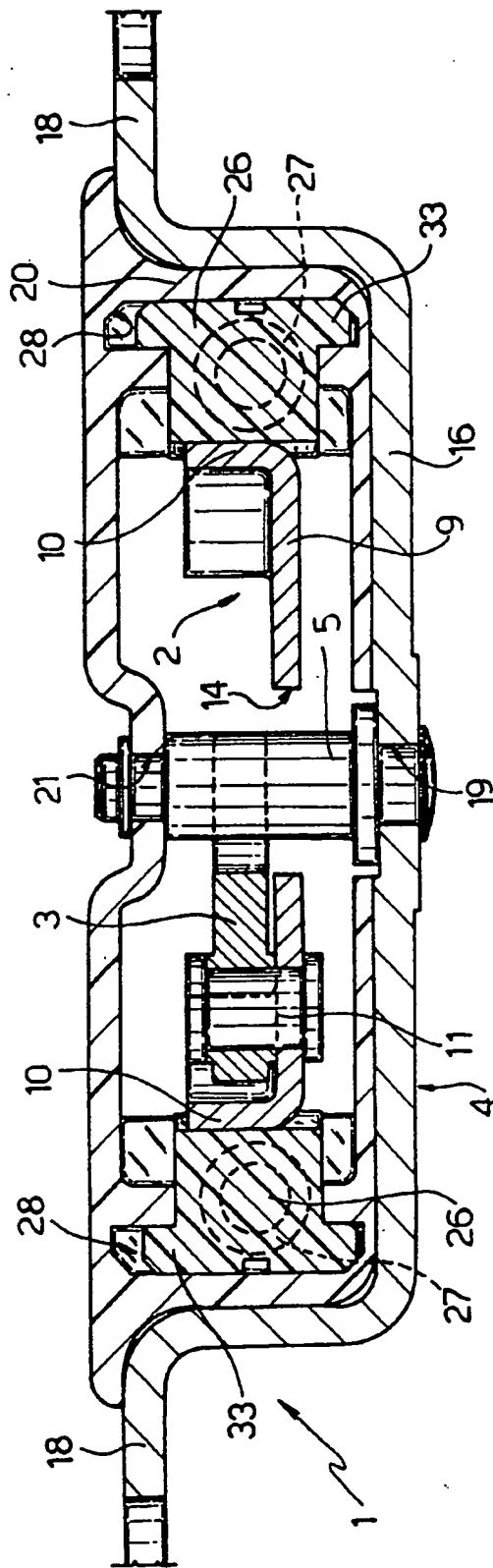
The slidable wedge-shaped blocks 26 are preferably constructed of a synthetic plastics material and are slidably inserted into respective opposing longitudinal guides 28 carried rigidly by the bracket 16 on the opposite sides of the pin 5 and are disposed perpendicular to this latter, they being provided with travel limiting means to prevent their expulsion from the guides 28 by the effect of the thrust of the elastic means 27, which consist preferably of respective helical springs housed in the guides 28 and each cooperating with a respective block 26. Specifically, the guides 28 are formed longitudinally within the plastics sleeve 20 with a substantially T-shaped cross-section and are closed at that end distant from the end 12, ie at the opposite end to that from which the element 9 is inserted into the bracket 16, by the perimetral base wall 29 of the sleeve 20, against which the springs 27 rest, these being inserted, each in a preloaded state, between a respective block 26 and the base wall 29 so as to cooperate with the blocks 26 to cause these latter when at rest to partly emerge from the bracket 16, to assume an end-of-travel position defined by respective transverse screws 30 which are carried by a portion 31 of the sleeve 20 projecting beyond the bracket 16 and abuttingly cooperate with respective longitudinal grooves 32 in the blocks 26. These latter each comprise a T-shaped side portion 33 slidably inserted into the relative guide 28 and provided with the groove 32, and a main portion bounded on the side distant from the side portion 33 by a pair of adjacent oblique surfaces 34 and 35. The more inclined surfaces 34 define a lead-in which facilitates the insertion of the lock plate 2 into the striker unit 4, whereas the surfaces 35 have the same inclination as the edges 10 and are arranged to slidably cooperate with these latter as soon as engagement of the slot 14 with the pin 5 commences.

When in use, the lock 1 is mounted with the striker unit 4 and lock plate 2 disengaged and positioned as in Figure 1. During closure of the











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# EUROPEAN SEARCH REPORT

Application Number

EP 88 11 7768

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
Y	GB-A-1 108 733 (W. BREEDEN) * Figure 1; page 2, lines 38-46 * ---	1-5	E 05 B 65/19
Y	FR-E- 92 967 (C.I. MECANISMES) * Figure 4; page 2, left-hand column, lines 35-38 * -----	1-5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			E 05 B E 05 F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13-01-1989	Examiner VAN BOGAERT J.A.M.M.
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